

*REMARKS*

In response to the Office Action mailed November 6, 2003, Applicant amends his application and requests reconsideration. In this Amendment non-elected claims 4-13 and examined claims 1-3 are canceled in favor of new claims 14-20.

The rejection of claim 2 relating to form is moot.

In this Amendment, the invention has been better defined by new claims, consistent with the application as filed. An important feature of the invention as described in the patent application is the measurement of characteristics of a slurry, i.e., dispersion and sizes of distribution of particles dispersed within a carrier, as the slurry is supplied for polishing of an object in a chemical mechanical polishing apparatus. As pointed out at page 11 of the patent application, in the paragraph beginning at line 9, the described apparatus includes a slurry supplying device as well as a measuring machine. In the embodiment of the apparatus illustrated in Figure 1 of the patent application, these elements are numbered 30 and 40, respectively. The measuring machine 40, in that embodiment, is between a reservoir from which the slurry is supplied and the chemical mechanical polishing apparatus receiving the slurry, where the polishing of an object occurs. Thus, the measuring machine measures characteristics of the slurry as it is being supplied to the chemical mechanical polishing apparatus. Specific characteristics described in the patent application are the distribution of the sizes of the particles within the slurry and the dispersal of the particles within the slurry. The latter characteristic is referred to in the patent application as the distribution of the slurry. It is apparent from the description from page 1, line 24 through page 2, line 16 of the patent application that distribution of particles, as used in the patent application, means the dispersal, i.e., the uniformity of distribution, of particles throughout the slurry.

After measuring the characteristics of the slurry, the chemical mechanical polishing apparatus is controlled with respect to any of a number of variables, to achieve a desired polishing speed, i.e., rate. The apparatus typically includes a pad that moves, usually by rotation, relative to the object being polished. The speed of rotation of that pad, the pressure applied to the polishing pad by the object, and other variables determine the polishing speed. As explained in the patent application with regard to an exemplary apparatus, information is stored as to the interrelationship of these variables and at least one slurry characteristic. Therefore, by measuring the slurry characteristic as the slurry is being supplied to the apparatus, the polishing process compensates for a slurry characteristic that varies from a reference slurry characteristic. These important features of the invention to which the

pending claims are directed are initially described in the patent application at pages 11-16 to which attention is directed.

None of the three patents cited by the Examiner in rejecting claims 1-3, as examined, can anticipate or suggest the invention as defined by new claims 14-20.

Claims 1-3 were rejected as anticipated by Yueh (U.S. Patent 5,791,970). Claim 2 was alternatively rejected as obvious over Yueh in view of Yu et al. (U.S. Patent 5,531,861, hereinafter Yu).

Neither of these rejections can be maintained as to the new claims because neither of Yueh or Yu describes measuring a characteristic of slurry as the slurry is being supplied to the polishing apparatus nor controlling polishing in response to the measured characteristic. Yueh is directed to a slurry recycling process and apparatus in which the characteristics of used slurry are measured in order to formulate a usable recycled slurry by the addition of unused slurry to the used slurry. The particle size detector 31 is only used to measure the particle size of a slurry that has been used or used slurry that is mixed with new slurry. There is no attempt to control a polishing process in response to measurement of the characteristics of slurry that is being supplied to a polishing apparatus. There is no assurance that the characteristics of slurry measured in Yueh have anything to do with the characteristics of slurry supplied in a polishing process. The recycled and "freshened" slurry may change in characteristics, e.g., particle size distribution and particle dispersal, between the time of "freshening" and supply to the polishing apparatus. Thus, Yueh cannot anticipate any pending claim.

In order to supply part of examined claim 2 that was acknowledged to be missing from Yueh, reliance was placed upon Yu. According to the Office Action, it would have been obvious to make a target polishing speed constant, language that does not appear in any pending claim, to provide a predictable end point for polishing. The issue is moot in view of the new claims.

In any event, the sentence in Yu pointed to by the Examiner as supporting this proposition only expresses a desired result, not a method of achieving that result. What is described in Yu as a method of achieving that result is cleansing the polishing pad during polishing by periodically applying ultrasonic energy to the pad. That disclosure has nothing to do with the present invention as disclosed or claimed. Yu is simply being read too broadly. Further, as already noted, Yu does not describe any apparatus or method for measuring slurry characteristics as the slurry is being supplied to the polishing apparatus. Therefore, no combination of Yueh and Yu can establish *prima facie* obviousness as to any pending claim.

Claims 1-3 were also rejected as anticipated by Shelton et al. (U.S. Patent 6,117,779, hereinafter Shelton). This rejection is respectfully traversed, and is inapplicable to the claims now pending.

Shelton, like Yueh, describes a chemical mechanical polishing apparatus in which a slurry is supplied from a slurry storage tank through a flow control element. The points emphasized in Shelton relate to the collection of the slurry after its use for recycling. In addition, the slurry is measured in Shelton for the presence of particular materials. The presence of those materials indicates the end point of the polishing process. This technique is not pertinent to the claimed invention.

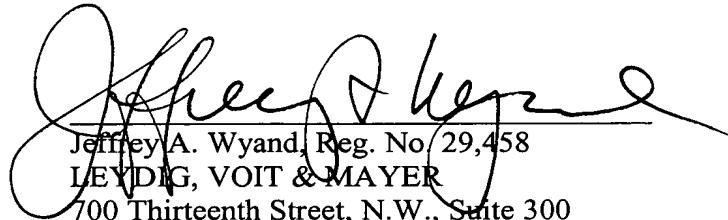
There is no description of nor suggestion in Shelton for measuring characteristics of slurry at the time the slurry is supplied to the apparatus for polishing an object, such as a semiconductor wafer. The same considerations that were discussed with regard to Yueh apply regarding recycled slurry in Shelton. Measuring and adjusting the characteristics of used slurry has little, if any, relationship to measuring slurry characteristics as the slurry is being supplied for polishing. For those reasons, Shelton could not anticipate any of the examined claims and cannot anticipate the pending claims.

Claim 2 was alternatively rejected as obvious over Shelton in view of Yu. This rejection is likewise traversed. Although the rejection is moot, for the reasons already presented with respect to the first rejection of claim 2, Shelton, considered by itself or in combination with Yu, cannot establish *prima facie* obviousness of any pending claim. That is, neither Shelton nor Yu provides any suggestion for measuring the characteristics of slurry at the time the slurry is supplied to the polishing apparatus.

In re Appln. of KAZUHIRO TANAKA  
Application No. 09/965,803

Upon reconsideration, the rejections as to examined claims 1-3 should be withdrawn and new claims 14-20 should be allowed.

Respectfully submitted,



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